

Claims

1. Pump apparatus (1) including:

5 a first container including a chamber (304), an inlet (302) and an outlet (305), the chamber being pressurisable to effect discharge through the outlet;

a control apparatus for causing periodic pressurisation and depressurisation of the chamber in response to the level of liquid in the container,

10 wherein the control apparatus includes a pilot valve (318) located in a second container (310) connected to receive liquid from the first container when the level of liquid in the first container reaches a predetermined level, the pilot valve being configured to trigger a pressurisation/depressurisation cycle in response to the liquid level in the second container.

15 2. Pump apparatus according to Claim 1, wherein the outlet (305) includes a non-return valve intended to allow liquid to pass therethrough only when the pressure of the liquid exceeds a predetermined threshold.

3. Pump apparatus according to Claim 1 or 2, wherein a shuttle valve (340) is used to allow the motive gas to enter or be vented from the first container (304).

20 4. Pump apparatus according to any one of the preceding Claims, wherein the second container (310) is relatively small compared with the first container (304).

25 5. Pump apparatus according to any one of the preceding Claims, wherein the second container (310) has its base at a relatively higher location than the base of the first container (304).

6. Pump apparatus according to any one of the preceding Claims, wherein the first (304) and second (310) containers are linked by a pipe or line (308) having a non-return valve (312).

5 7. Pump apparatus according to any one of the preceding Claims, further including a compressed air supply (320), the compressed air being used as the motive gas.

10 8. Pump apparatus according to any one of the preceding Claims, further including a compressed air supply (320), wherein the compressed air is supplied to or vented from a thruster cylinder (410) which operates to supply or vent steam for pressurisation/depressurisation of the first container (304).

15 9. Pump apparatus according to any one of the preceding Claims, further including another said pump apparatus connected in parallel to a first pump apparatus, each said pump having a further valve component (402, 404) connected to a line for venting the motive gas from at least the first container (304A, 304B) of each said pump, the further valves configured to open the venting valve (404A) of one said pump when the venting valve (404B) of the other said pump is closed.

10. Pump apparatus (500) including two pumps, each said pump respectively including:

20 a first container including a chamber (304), an inlet (302) and an outlet (305), the chamber being pressurisable to effect discharge through the outlet, and

25 a control apparatus (402, 404, 508) for causing periodic pressurisation and depressurisation of the chamber in response to the level of liquid in the container; the apparatus being arranged so that when one said pump is discharging liquid, the other pump is receiving liquid through its respective inlet.

11. Pump apparatus according to Claim 10, wherein the two pumps are connected together by means of a further valve component (402, 404) connected to a line for venting the motive gas from at least the first container of each said pump, the further valve configured to open the venting valve (404A) of one said pump when the venting valve (404B) of the other said pump is closed.

12. Pump apparatus according to Claim 10 or 11, wherein the two pumps are connected together by means of a further valve component having an automatic valve in the inlet line (302) of each said first chamber (304A, 304B), the valves arranged such that when the chamber (304A) of one said pump is discharging, the chamber (304B) of the other said pump is receiving liquid through its inlet.